

Drainage Manual References

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Laws and Regulations

See text in Appendix for contact information.

Glossary

Amendment. See *Soil amendment*; see *Water amendment*.

Anion. Negatively charged constituent or ion in the water. Chloride, sulfate, and bicarbonate are anions.

Application uniformity. See *Distribution uniformity*.

Attainable leaching fraction. The smallest average leaching fraction required under a given set of conditions to satisfy crop needs and control salinity in the least-watered parts of the field.

Cation. Positively charged constituent or ion in the water. Sodium, calcium, magnesium, and potassium are cations.

Cation exchange capacity. Relative capacity of positively charged ions (cations) attached to clay particles in a given soil to be exchanged for other types of cations in the soil solution. Too much sodium on the clay particles relative to calcium and magnesium can cause the clay to swell, making the soil less permeable to water.

Chlorosis. Yellowing or bleaching of leaves, often induced by a nutrient deficiency, specific-ion toxicity, or disease.

Continuous ponding. The process of reclaiming saline soils by ponding water on the soil surface until enough salt has been removed from the crop root zone.

Crop water use. The amount of water used by a specific crop in a given period of time.
See also *Evapotranspiration*.

Deep percolation. The phenomenon of irrigation water flowing through the soil past the root zone where it is lost to crop production.

Distribution uniformity (DU). A measure of how uniformly water is applied over a field, calculated as the minimum depth of applied water, divided by the average depth of applied water, multiplied by 100.

Electrical conductivity. The extent to which water conducts electricity, which is proportional to the concentration of dissolved salts present and is therefore used as an estimate of the total dissolved salts in soil water. Electrical conductivity is expressed in millimhos per centimeter (mmhos/cm) or decisiemens per meter (dS/m):

EC_i , EC_{iw} , or EC_w = electrical conductivity of the irrigation water

EC_{sw} = electrical conductivity of the soil water

EC_e = electrical conductivity of the saturated soil extract

Evapotranspiration. The amount of water used by a specific crop in a given period of time, comprised of water evaporating from the soil and water transpiring from the plants. Crop evapotranspiration estimates are available from the California Department of Water Resources CIMIS program and from University of California Cooperative Extension offices as either historical averages or real-time estimates.

Exchangeable Sodium Percentage (ESP). The percentage of exchangeable sodium that occupies the total cation exchange capacity of the soil. ESP can be calculated from the following formula:

$$ESP = \frac{\text{Exchangeable (meq/100g)}}{\text{Cation exchange capacity (meq/100g)}} \times 100$$

Foliar absorption rate. Rate at which constituents in water are absorbed by plant leaves.

Glycophytes. A group of plants adversely affected by salinity. Most crop plants are glycophytes.

Halophytes. Plant group capable of tolerating relatively high levels of salinity.

Hydraulic conductivity. The ease with which water flows through the soil, determined by the physical properties and water content of the soil.

Infiltration rate. The rate at which water infiltrates the soil, usually expressed in inches or centimeters per hour.

Interceptor drain. Usually a single drain line installed perpendicular to the direction of groundwater flow, used to remove shallow groundwater flowing from upper-lying areas or to intercept seepage from waterways.

Intermittent ponding. A method of reclaiming saline soil by ponding small amounts of water on the soil surface in a wetting and drying cycle.

Ion. A positively or negatively charged constituent in water. Cations are positively charged ions and anions are negatively charged ions. Sodium, calcium, magnesium, and potassium are cations, and chloride, sulfate, and bicarbonate are anions.

Irrigation efficiency. A measure of the portion of total applied irrigation water beneficially used – as for crop water needs, frost protection, salt leaching, and chemical application – over the course of a season. Calculated as beneficially used water divided by total water applied, multiplied by 100.

Leaching. Applying irrigation water in excess of the soil moisture depletion level to remove salts from the root zone.

Leaching fraction. The fraction of infiltrated water applied beyond the soil moisture depletion level, which percolates below the root zone as excess water.

Leaching requirement. The leaching fraction needed to keep the root zone salinity level at or below the threshold tolerated by the crop. The leaching fraction is determined by the crop's tolerance to salinity and by the salinity of the irrigation water.

Necrosis. Plant condition indicated by the presence of dead tissue, often induced by an extreme nutrient deficiency, disease, or specific ion toxicity.

Parallel drainage system. Drainage system consisting of buried perforated pipe placed at equal intervals throughout a field for draining away subsurface water caused by deep percolation through the overlying land. Also called a relief drainage system.

Piezometer. Device for monitoring groundwater depth and movement by measuring the hydraulic head at a point below the water table or water level.

Polymers. Soil amendments reputed by manufacturers to react with lime in the soil to supply free calcium.

Pre-irrigation reclamation method. A method of estimating the amount of irrigation water needed for leaching to reduce soil salinity to acceptable levels during pre-irrigations.

Relief drainage system. See *Parallel drainage system*.

Saline/sodic soil. Soil affected by both excess salt and excess sodium.

Salinity. Soil condition in which the salt concentration in the crop root zone is too high for optimum plant growth and yield.

Sodicity. Condition in which the salt composition of the soil within the crop root zone is dominated by sodium, which affects soil structure and water infiltration.

Sodium adsorption ratio (SAR). Relationship between the concentration of sodium (Na) in the irrigation water relative to the concentrations of calcium (Ca) and magnesium (Mg), expressed in meq/l as follows:

$$SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$$

Soil amendment. A substance added to the soil primarily to improve its physical condition.

Specific-ion toxicity. Injury to the plant caused by a specific constituent, usually chloride, boron, or sodium, that has accumulated in a particular part of the plant, such as leaves and stems.

Total dissolved solids (TDS). A measure of the dissolved solids in soil water, expressed in either parts per million or milligrams per liter, used to estimate the relative salinity hazard of the water.

Uniformity. See *Distribution uniformity*.

Water amendment. Chemicals added to water to improve soil-water properties, such as water infiltration.

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